

REMARKS

Applicant respectfully traverses the 35 U.S.C. § 103(a) rejection of claims 1,3, and 6 over U.S. 2002/016554 to Nemoto. Applicant also traverses the § 103(a) rejection of claims 2, 7-9, and 11 over Nemoto in view of U.S. Patent 6,696,197 to Inagaki, and the § 103(a) rejection of claims 10 and 12 over Nemoto, Inagaki, and U.S. Patent 6,437,542 to Liaw.

As recited in claim 1, a safety mechanism is activated ten or more seconds before an inside short circuit occurs. As recited in claim 7, a safety mechanism is activated before an inside short circuit occurs so as to discharge decomposition gas of an electrolytic solution, which is generated inside the battery, to an outside of the battery, based on a first time which is after overcharging is started until discharging the decomposition gas and a second time which is after overcharging has started until the short circuit occurs, wherein a time difference between the first time and the second time is ten seconds or more.

None of the cited references disclose or suggest a safety mechanism in a lithium ion secondary battery in which activation of the safety valve is set based on the amount of electrolytic solution provided with the battery, and wherein the safety mechanism is activated ten seconds or more before an inside short circuit occurs.

Increasing the amount of electrolytic solution provided with the lithium ion secondary battery suppresses precipitation of lithium on the electrode, and hence suppresses occurrence of an inside short circuit. By not disclosing the above-described features of the claims, the cited prior art does not recognize or obtain this benefit, and does not render the claims obvious under 35 U.S.C. § 103(a).

For example, referring to paragraph [00141] of Nemoto, a pressure relief valve is provided to prevent accidents such as a burst of the battery caused by an increase in the battery's internal pressure due to evaporation of electrolyte solution, caused by battery temperature rising as a result of over-charging or over-discharging. Nemoto, therefore, discloses a relationship between excessive internal pressure and pressure relief, but does not disclose or suggest a relationship between inside short-circuit occurrence time and an activation time of a safety mechanism, and particularly not that a safety mechanism is activated ten seconds or more before an inside short-circuit occurs.

Inagaki discloses avoidance of occurrence of an ignition reaction within a portable electronic appliance by absorbing leaking electrolyte using a sheet capable of absorbing the electrolyte, when the secondary battery case is broken. Since ignition can occur at any time, there is no suggestion or motivation in Inagaki to control duration between occurrence of an inside short-circuit and activation time of a safety mechanism, and no such time relationship is disclosed, particularly not that a safety mechanism is activated ten seconds or more before occurrence of an inside short circuit.

In contrast, the claims recite that a safety mechanism is activated ten seconds or more before an inside short circuit occurs, which for the reasons stated above, is neither disclosed nor suggested by either Nemoto or Inagaki, alone or in combination.


In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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